Quarterly Report

Covering October 1, 2006 to December 31, 2006

Submitted January 3, 2007

Project Title

Warm Water Species Fish Passage in Eastern Montana Culverts

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Introduction

This progress report covers work completed between October 1, 2006 and December 31, 2006. Work on the project during this period has been primarily devoted to preliminary data analysis.

Project Objective

Culverts are a common and often the most cost effective means of providing transportation intersections with naturally occurring streams or rivers. Fish passage and fish habitat considerations are now typical components of the planning and design of waterway crossings. Many culverts in Montana span streams that support diverse fisheries. The health of these fisheries is an essential element of a recreational industry that draws hundreds of thousands of visitors to Montana annually. Additionally, there is growing recognition of the value of native Montana species, some of which are considered 'species of special concern' in the state. In recent years these concerns have become apparent for warm water species in low gradient, high sediment bearing, intermittently flowing streams that are typical of eastern Montana.

Transportation system planners, designers and managers recognize that fish passage through Montana's culverts is a concern. However, there is much contention concerning the impact that a culvert can have on a fishery. Recent basin-wide studies of various trout species that we conducted in western Montana indicate that the tools that some planners and designers promote for forecasting fish passage concerns may be overly conservative. Which species, life stages, and how many individuals must have fish passage access for how long, are questions that are often brought forward during discussions on the design and retrofitting of culverts to accommodate fish passage concerns. ***The problem is that for warm water fish species and settings in eastern Montana, the timing and number of fish that must pass a culvert to maintain viable species diversity in the watershed is unknown, and the physiologic abilities of these species relative to such common fish passage questions are often unknown.***

Progress

The time period covered in this report was devoted to retrieval of field equipment and preliminary data analysis. There are three primary groups of data to be analyzed; relative abundance and species richness, mark-recapture, and hydrologic-hydraulic data. An example of preliminary results for the relative abundance and species richness data is shown in Figure 1. In this example, a coarse look would indicate that most species have similar abundance throughout the reach. Figure 2 shows only the fish counts for longnose dace, fathead minnow and sand shiner. In this view, it is clear that sand shiner and fathead minnow have reduced populations above the Highway Xing culvert. Statistical analyses of these types of comparisons are underway.

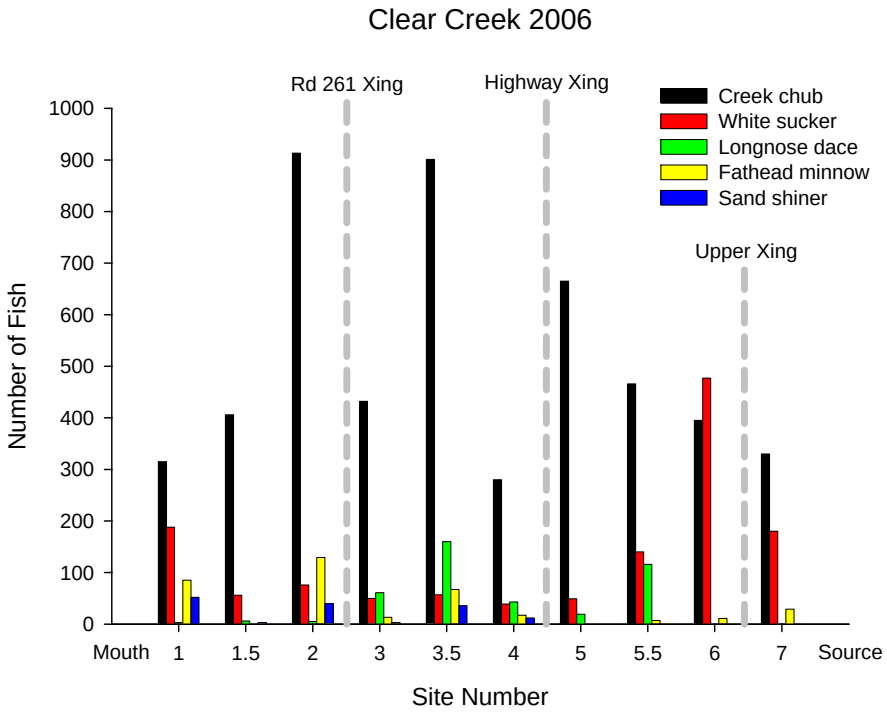

Figure 1. An example of relative abundance and species richness results for Clear Creek.

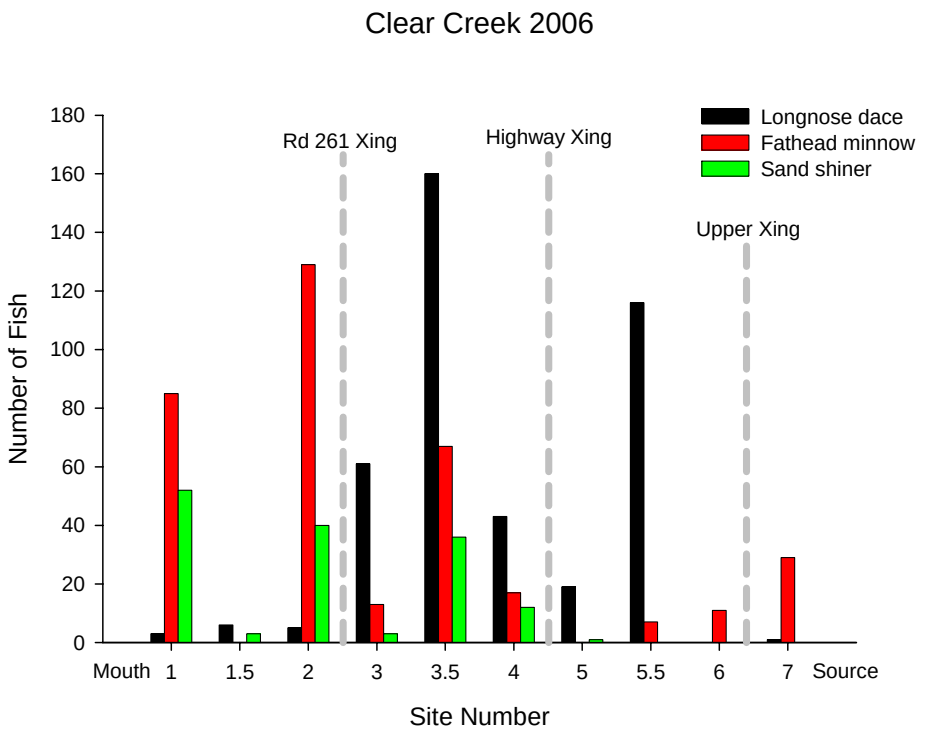

Figure 2. Closer examination of the example of relative abundance and species richness results for Clear Creek shown in Figure 1.

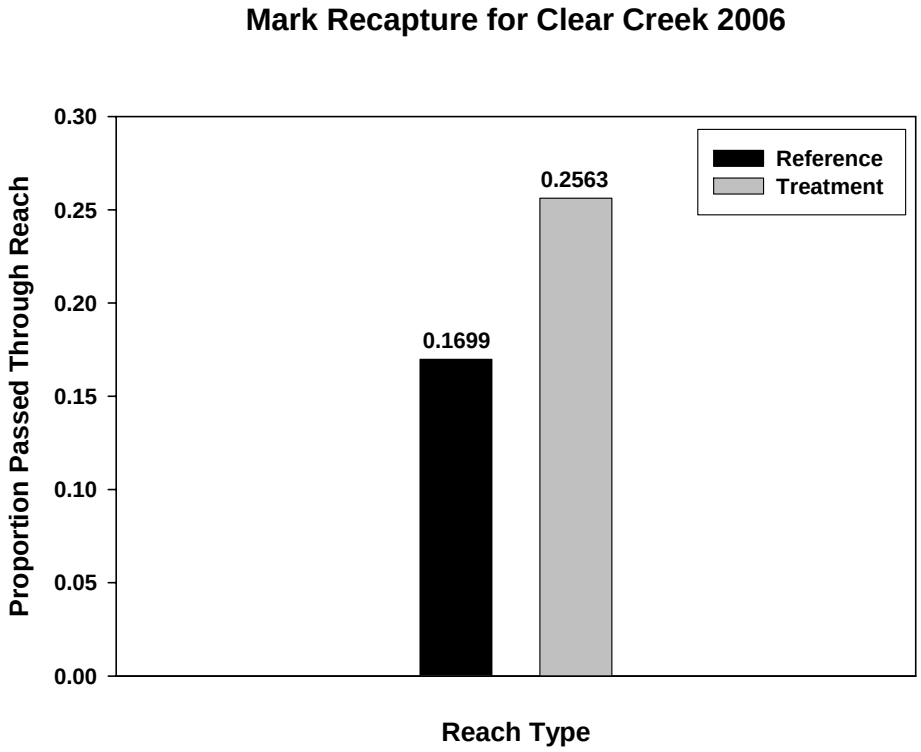

Figure 3. An example of preliminary (pooled) mark-recapture results.

Figure 3 shows some preliminary results of the mark-recapture experiment. At this site, 418 fish were marked in the control reaches, of which 71 were recaptured upstream (16.99 %). There were 480 fish marked in the treatment (culvert) reaches, with 123 recaptured upstream of the culverts (25.63%). This example has all fish species pooled at all control and treatment reaches on the creek. The statistical analyses that are still underway will include separation by species and culvert. While the preliminary results shown in Figure 3 look promising from the standpoint of fish mobility, what cannot be seen in these preliminary results is whether or not a particular species found a particular culvert to be impassable.

Hydrology/hydraulic analyses consist primarily of correlating observed flow events to observed culvert velocities. Once that is accomplished, the flow information that was data logged throughout the project duration can be used to facilitate culvert velocity predictions at any point in time. This analysis is still underway.

Budget

Expenditures for this cycle are largely the result of stipends and travel. The planned and actual expenditures still deviate due to a change in project personnel. Stipends will be shifted to remaining personal to accomplish all the project goals as we finish out the project. Also, as before, expenditures for tuition and fees for students lag the reporting cycle.